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ABSTRACT

Recent educational research indicates that learners differ in their preferences for learning mode and strategies. Implications for instruction and assessment are discussed as they relate to the Theory of Multiple Intelligences of H. Gardner (1983). One of the principles of the "Learner Centered Psychological Principles" of the American Psychological Association (Principle 11) stipulates that learners have unique abilities and talents and have acquired different preferences for how they learn, as well as different preferences for how they respond to learning situations. Gardner's Theory of Multiple Intelligences exemplifies Principle 11 and is implicated in Principle 12, which states that the development of a child and the way the child interprets life experiences is influenced by his or her education. The Theory of Multiple Intelligences describes seven forms of human competence that are relatively independent: linguistic; logical-mathematical; spatial; bodily-kinesthetic; musical; interpersonal; and intrapersonal intelligences. Some programs in use in schools today apply Gardner's theory. The Key School in Indianapolis (Indiana), the Arts PROPEL program in Pittsburgh (Pennsylvania), and Project Spectrum are three examples. Preliminary results from teachers in these programs suggest that students are more motivated and that at-risk students can excel. Implications for educational practice are discussed. Three tables summarize some important points from the discussion. (Contains 11 references.) (SLD)

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Individual Differences and Multiple Intelligences

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Abstract

Recent educational research indicates that learners differ in their preferences for learning mode and strategies. Thus, learning outcomes are related to student differences. Implications for instruction and assessment will be discussed, especially as it relates to Gardner's (1983) Theory of Multiple Intelligences.

Individual Differences and Multiple Intelligences

The "Learner-Centered Psychological Principles" (LCP) (APA, 1992) developed by the American Psychological Association's (APA) Task Force on Psychology in Education focus on five major factors: (1) Metacognitive and cognitive, (2) Affective, (3) Developmental, (4) Social, and (5) Individual Differences. The present paper concentrates on the relationship between individual differences and the learner-centered principles.

The two principles that are addressed under the heading of individual differences are:

Principle 11: Although basic principles of learning, motivation, and effective instruction apply to all learners (regardless of ethnicity, race, gender, presence or absence of physical handicaps, religion, or socioeconomic status), learners differ in their preferences for learning mode and strategies, the pace at which they learn, and unique capabilities in particular areas. These differences are a function of both environment (what is learned and communicated in different cultures or other social groups) and heredity (what occurs naturally as a function of genes and resulting differential capacities).

Principle 12: Beliefs and thoughts, resulting from prior learning and based on unique interpretations of external experiences and messages, become each individual's basis for constructing reality or interpreting life experiences. (APA, 1992, p. 6)

Basically, Principle 11 stipulates that learners have unique abilities and talents, and have acquired different preferences for how they learn, as well as different preferences in how they respond to learning situations. In this regard, Gardner's (1983) Theory of Multiple Intelligences (MI) exemplifies Principle 11. Also, Gardner's theory is implicated in Principle 12. For example, the development of a child and the way that child interprets life experiences is influenced by his/her education.

Theory of Multiple Intelligences

Gardner's (1983) theory of MI stipulates seven forms of human competence that are relatively independent: linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, and intrapersonal intelligences. (See Table 1.) Gardner noted that in

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Insert Table 1 about here

Western societies, most schools teach and test to the linguistic and mathematical intelligences. He, however, emphasizes the importance of exposing students to classroom activities in all seven competences so that inherent strengths can be engaged in the learning process (MacRae-Campbell, 1992). This view of human intelligence provides a framework for curriculum development and instructional methods. Basically, Gardner's (1983) theory offers a child-centered model of education.

Since Gardner uses the term intelligence in his theory, it would be appropriate to define intelligence. According to Gardner, intelligence is "the capacity to solve problems or to fashion products that are valued in one or more cultural settings" (Gardner & Hatch,

1989, p.5). Also, Gardner notes that all humans differ from one another in the specific profile of intelligences that they exhibit. Further, he stipulates that there is no correlation between any two intelligences (Gardner & Hatch, 1989).

Gardner feels that these intelligences can not be measured by standard forms of assessment; namely paper and pencil tests. He and his colleagues are presently developing "intelligence fair" measures to distinguish each intelligence. These "intelligence fair" measures would take place in culturally-valued activities. (See Table 2.) Thus, educators need to take a broader view of human achievement and performance as they appear in

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Insert Table 2 about here

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different domains of accomplishment. According to Hatch and Gardner (1990), teachers need to shift their focus from ranking students to assisting them in enhancing their own intellectual capacities. This can be accomplished by teachers being sensitive to individual differences in how students learn and to give them methods suited to their own styles (Armstrong, 1990). Table 3 provides examples of educational tools that can help meet this broad range of learning abilities.

Insert Table 3 about here

Examples of MI Theory in Practice

The Key School. The Key School is an elementary school in Indianapolis that uses video portfolios to document and assess student projects (Hatch & Gardner, 1990). These projects are based on a school-wide theme, (e.g., "Patterns"), which ties the curriculum together. The themes change every nine weeks. The intent of this approach is to gather information about the growth of the student's thinking within various modes of expression and/or communication. In addition, the students spend time in "pods" four days a week (Olson, 1988). The "pods" are multi-aged groupings, which emphasize work in a particular area, (e.g., math).

In order to motivate the children, the Key school emphasizes children's strengths (Olson, 1988). Thus, the school uses the child's strength(s) as intrinsic motivation. Also, students spend part of each week in a "flow-activity center" where there are materials geared to each of Gardner's seven intelligences.

Arts PROPEL. Arts PROPEL is a project conducted in the Pittsburgh Public School System that assesses growth and learning in middle and high school. This is accomplished through the use of curriculum-compatible "domain projects" and students' portfolios (Hatch & Gardner, 1990). As in the Key school, the domain projects focus on a central theme or issue, especially in the arts. In addition to teacher assessment of the portfolios, students review their own portfolios and select the products that serve as a basis for more formal assessments that reflect their progress. These assessments involve the individual intelligences.

The competences measured in music, art, and imaginative writing are production (e.g., composing music), perception (e.g., effecting distinctions within an art form), and reflection (e.g., stepping back from one's own perceptions and seeking to understand the goals, methods, difficulties, and effects achieved (Gardner, 1989). These competences make up the acronym PROPEL with the "L" standing for learning.

Project Spectrum. Project Spectrum was designed to determine if preschool and kindergarten children have distinct profiles of ability. Later it was extended to the elementary grades. This project is based on the "assumption that every child has the potential to develop strength in one or several content areas and that it is the responsibility of the [school] to discover and nurture these proclivities" (Krechevsky, 1991, p. 44). Many curriculum activities and assessment options suitable for a "child-centered" school were developed (Gardner & Hatch, 1989). (See Table 2.) In a "Spectrum" classroom the children can choose from a variety of "intelligence fair" materials that engage their intelligences (Hatch & Gardner, 1990). As in the Key School and Arts PROPEL, descriptions of a child's strengths and weaknesses are prepared by the teachers. Also, the teachers' reports include suggestions for activities that will give the child opportunities to excel. Further, project Spectrum "stresses the notion that every child is unique" (Krechevsky & Gardner, 1990, p. 230).

Results. Preliminary results, as reported by teachers from these three alternative programs, indicated that students were more motivated and that students who were considered at-risk excelled (Gardner & Hatch, 1989). Also, there was some evidence from the Project Spectrum results that a child's strength in one area might facilitate performance in

another area (Krechevsky & Gardner, 1990). Krechevsky and Gardner (1990) pointed out that there are a number of factors and conditions that seem to work together to determine whether a strength surfaces and develops. They are"...the range of areas provided and emphasized in the classroom; family knowledge and interest in an area; the child's own fluctuating interests...and the nature of the domain at the particular point in the child's development." (p. 211).

Implications

Implications for Research

First, both MI theory and the APA's LCPs are new approaches to education and assessment. Thus, research must continue to develop reliable and valid instruments to assess students' multiple intelligences. Also, research must continue to determine the effectiveness of this approach to learning. Further, from their research Gardner and Hatch (1989) stated that future research on MI theory should pay closer attention to: (1) the developmental appropriateness of the materials, (2) the social class background, and (3) the exact deployment of Spectrum materials and assessment instruments in the classroom. Interestingly, APA's LCPs address the first two issues above, as well as assessment.

Other research of interest would be to disprove MI theory. For example, if performance on various activities are correlated, or if the intelligences are correlated, then MI theory will have to be revised. Also, Gardner (1983) reported that very little research has been conducted in "charting the general principles that may govern progress through an intellectual domain." (pp. 388-389).

Implications for Practice

There are several challenges for educators that arise from MI theory and the LCPs. First, educators must help their students overcome any "hurdles" so that they can progress satisfactorily through each intellectual domain (Gardner, 1983). Also, from MI theory comes the issue of match between student and method. According to Gardner (1983), "[a] 'matching system' should help ensure that a student can rapidly and smoothly master what needs to be mastered, and thus be freed to proceed further along both optional and optimal paths of development." (p. 389). Obviously, this is not a new concept in education, but it is one that has merit.

In addition, the MI approach that is exemplified in Project Spectrum suggests some benefits to students. First, the Spectrum approach exposes young children to more domains that are typically included in early childhood curricula. Second, children are involved actively in the assessment process. Third, this approach can be used as assessment, as curriculum, or as a philosophical framework (Krechevsky, 1991). Moreover, Krechevsky (1991) stated that "Because the approach takes individual differences seriously, it enables teachers to accommodate diverse populations and to individualize curriculums." (p. 48). In addition, Krechevsky speculated that this approach may be suited for at-risk children. These issues also are presented in APA's LCPs.

Another challenge in the classroom is to reliably measure and record a student's progress in each of the seven intelligences. Also, teachers would need to develop an intellectual profile for each student (Olson, 1988). In addition, teachers should model the

instructional processes that students are required to learn, and they need to engage all seven intelligences (MacRae-Campbell, 1992).

Conclusion

MI theory has the potential, along with the LCPs, to change the ways educators think about learning and schools. In addition, MI theory encourages the development of a child's abilities and interests by providing opportunities for an early and meaningful connection to a content area (Krechevsky & Gardner, 1990). Finally, as Hatch and Gardner (1990) stated, it would be wonderful "to imagine a school that does not depend on tests, but utilizes a variety of methods to engage and assess the abilities of each individual." (p. 428).

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Table 1

The Seven Intelligences

Intelligence	End-States	Core Components
Logical-mathematical	Scientist Mathematician	Sensitivity to and capacity to discern logical or numerical patterns; abilities to handle long chains of reasoning.
Linguistic	Poet Journalist	Sensitivity to the sounds, rhythms, and meanings of words; sensitivity to the different functions of language.
Musical	Composer Violinist	Abilities to produce and appreciate rhythm, pitch, and timbre; appreciation of the forms of musical expressiveness.
Spatial	Navigator Sculptor	Capacities to perceive the visual-spatial world accurately and to perform transformations on one's initial perceptions.
Bodily-kinesthetic	Dancer Athlete	Abilities to control one's body movements and to handle objects skillfully.
Interpersonal	Therapist Salesman	Capacities to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people.
Intrapersonal	Person with detailed, accurate self-knowledge	Access to one's own feelings and the ability to discriminate among them and draw upon them to guide behavior, knowledge of one's own strengths, weaknesses, desires, and intelligences.

Source: Gardner, H. & Hatch, T. (1989). Multiple intelligences go to school: Educational implications of the theory of multiple intelligences. Educational Researcher, 18 (8), 4-10.

Table 2

Spectrum Assessments used in 1987-88

Dinosaur Game: the Dinosaur Game is designed as a measure of a child's understanding of number concepts, counting skills, ability to adhere to rules, and use of strategy.

Bus Game: the Bus Game assesses a child's ability to create a useful notation system, perform mental calculations, and organize number information for one or more variables.

Treasure Hunt Game: the Treasure Hunt Game assesses a child's ability to make logical inferences. The child is asked to organize information to discover the rule governing the placement of various treasures.

Assembly Activity: the Assembly Activity is designed to measure a child's mechanical ability. Successful completion of the activity depends on fine motor skills and visual-spatial, observational and problem-solving abilities.

Art Portfolios: the contents of a child's art portfolio are reviewed twice a year, and assessed on criteria that include use of lines and shapes, color, space, detail, and representation and design. Children also participate in three structured drawing activities. The drawings are assessed on criteria similar to those used in the portfolio assessment.

Music Production Activity: the Music Production Activity is designed to assess a child's abilities to maintain accurate pitch and rhythm while singing and to recall a song's musical properties.

Music Perception Activity: the Music Perception Activity assesses a child's ability to discriminate pitch. The activity consists of song recognition, error recognition and pitch discrimination.

Storyboard Activity: the Storyboard Activity measures a range of language skills including complexity of vocabulary and sentence structure, use of connectors, use of descriptive language and dialogue, and ability to pursue a storyline.

Creative Movement: the ongoing movement curriculum focuses on children's abilities in five areas of dance and creative movement--sensitivity to rhythm, expressiveness, body control, generation of movement ideas, and responsiveness to music.

Classroom Model: the purpose of the Classroom Model Activity is to assess a child's ability to observe and analyze social events and experiences. A model of the classroom and figures with photographs of each member of the class are used to help children describe the social interactions that take place and to reflect on the relationships that are formed within the classroom.

Source: Hatch, T., & Gardner, H. (1990). If Binet had looked beyond the classroom: The assessment of multiple intelligences. International Journal of Educational Research, 14, 415-429.

Table 3

Examples of Educational Tools that Can Meet a Broad Range of Learning Abilities

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- *Linguistic intelligence:* Books, tape recorders, typewriters, word processors, label makers, printing sets, storytelling, talking books, writing materials, discussions, debates, and public speaking.

- *Logical-mathematical intelligence:* Strategy games (chess, checkers, Go), logic puzzles (Rubik's cube), science kits, computer programming soft-ware, nature equipment, brain teasers, Cuisenaire rods, and detective games.

- *Spatial intelligence:* Films, slides, videos, diagrams, charts, maps, art supplies, cameras, telescopes, graphic design software, three-dimensional building supplies (Legos, O-stix), optical illusions, visualization activities, and drafting materials.

- *Bodily-kinesthetic intelligence:* Playgrounds, obstacle courses, hiking trails, swimming pools, gymnasiums, model-building kits, wood-carving sets, modeling clay, animals, sports equipment, space to move, carpentry materials, machines, costumes for drama, and video games.

- *Musical intelligence:* Percussion instrument, metronomes, computerized sound systems, records and tapes, musical instruments (pianos, guitars, saxophones), the human voice, the sounds of nature, and things to strum, tap, pluck, and blow into.

- *Interpersonal intelligence:* Clubs, committees, after-school programs, social events, cooperative learning, interactive software, group games, discussions, group projects, simulations, competitive and non-competitive sports, and peer teaching.

- *Intrapersonal intelligence:* Self-paced instruction, individualized projects, solo games and sports, forts, tree houses, lofts and other spaces to retreat to, diaries and journals, mediation, and self-esteem activities.

Source: Armstrong, T. (1990). Beyond the three R's: Developing all seven forms of intelligence. Utne Reader, 41, 82-83.